ENG. WIFREDO G. BLANCO-PI COMMENTS ON FCC NPRM 13-249 TO REVITALIZE AM RADIO AND PROPOSAL TO PERMANENTLY AUTHORIZE THE USE OF AM SYNCHRONOUS BOOSTERS

I. DISCUSSION ON THE ISSUE:

I am a naturalized American citizen born at Cuba. I am now 82 years old. Since I was 25 years old I've been an AM broadcaster, first at Cuba, and years after in Puerto Rico. I am a licensed professional electrical engineer dedicated my whole life to broadcasting and broadcasting engineering.

I believe AM radio should be seen just as a citizen with handicaps or disabilities is seen by the society. Both deserve all the help possible from society and in the case of AM radio it deserves all the possible help from the FCC and the broadcast industry to overcome those disabilities. **I believe the FCC should make available to AM broadcaster not one or two or three initiatives that could help AM but a full catalog of tools, since some may be useful to some broadcasters and other could be useful to other AM broadcasters.**

FM has everything to succeed and AM everything to fail. In reality no one would listen to an AM radio at a noisy city just with 5 mv/m. Even with 25 mv/m (let's say perhaps an acceptable noise free signal) noisy power lines, computers, microwave ovens, fluorescent lamps, thunderstorms, etc. could make a listener switch to FM radio. Inside buildings AM signal is much lower than at the outside making it extremely difficult to tune to AM stations inside a building without noise. FM stations can be listened to inside buildings with excellent quality and noise free.

An FM station can make a relatively economical installation on top of a building or in a small site on top of a mountain, when an AM station needs several acres has to make a costly installation. That FM station can easily have a large noise free service contour, when an AM rapidly goes under the noise free signal. An FM station can easily serve a large amount of cities noise free when an AM stations is very limited in its noise free market.

About sound, AM sound is not as great as analog or digital FM sound, but most important is to have as much as possible a large noise free contour to make an AM station compete with large noise free FM contours.

Although the idea sounds good as in the Titanic, there are no sufficient FM translator 'lifesavers' for everybody until the FCC decides to migrate the entire AM band to FM. So AM stations have to improve their AM service as much as possible to compete with powerful and noise free FM signals.

Since 1988 (*See footnote#1*) I have been experimenting along with my son, a licensed electrical engineer, with AM synchronous boosters in Puerto Rico operating continuously for several

years, uninterruptedly and successfully two stations synchronized on 680 Khz. and three stations synchronized on 1260 Khz.: WAPA-AM, WA2XPA-AM, WISO-AM, WI2XSO-AM, WI3XSO-AM. I pretended to operate 4 (four) synchronized stations on 1260KHz. having on file an application for the fourth synchronized station on 1260 KHz in Puerto Rico but FCC's Audio Division understood increasing the number of overlapping signals to evaluate performance of the system was unnecessary and dismissed it. The application, BPEX-20090706AHD, has been waiting for Review by the FCC several years now (since 08/16/2011). It would have been a great opportunity to evaluate for example how 4 (four) high power AM boosters would interact in a tiny island as Puerto Rico:

WISO (1260 Khz.), Ponce, P. R. :	2.5 KW-D, 2.0 KW-N	ON AIR
WI2XSO (1260khz.), Mayaguez. P. R. :	5.0 KW-D, 1.8 KW-N	ON AIR
WI3XSO (1260kHZ.), Aguadilla, P. R. :	4.8 KW-D, 5.0 KW-N	ON AIR
and the proposed WI4XSO (1260 kHZ.), Guayama, P. R.:	0.75KW-D, 0.5 KW-N	(waiting for FCC REVIEW)

I also operate:

WAPA (680 Khz.), San Juan, P. R. 10KW, Unlimited
and WA2XPA (680kHZ.) Arecibo, P. R. (680Khz.) 0.4 KW-D, 0.57 KW-N.

(See map of Puerto Rico showing the AM synchronous stations developed by me.)

All of them have proven AM synchronous boosters are an excellent tool for an AM radio station to improve service and to extend coverage making it easier for AM station to survive in the competition against FM stations. Puerto Rico is a small but highly populated island (100miles x 35 miles in area) and 3.8 million habitants.

II. PLEADING TO THE AUDIO DIVISION AND THE HONORABLE COMMISSIONERS:

THE FCC states in NPRM TO REVITALIZE AM RADIO SERVICE (MB DOCKET No. 13-249) section G, p. 45:

"We recognize that there are other ideas that have been proposed to assist in revitalizing AM radio. These include: ....adopting rules to permit the permanent licensing of AM synchronous transmission systems.... These mmore complex suggested reforms would require additional comment, research and analysis."

Consistent with this statement we urge the FCC to grant the REVIEW petition for the fourth AM synchronous booster that was requested in BPEX-20090706AHD that was denied by the Audio Division stating that no more experimentation was needed. Obviously, to have FOUR interacting synchronous transmitters operating on 1260 Khz., in a small island as Puerto Rico with complex topography is germane to further research, analysis and comments on the performance of AM synchronous boosters.

III. BENEFITS OF AM SYNCHRONIZED BOOSTERS:

1. Permits the best possible use of a single frequency allowing an AM station to improve and/or expand its coverage mantaining protection to co-channels and adjacent channels day and night.

2. **AM boosters can be synchronized in frequency, audio phase and audio delay at overlap area. FM boosters can't be synchronized**. A 10 Mhz, GPS satellite reference signal and a digital audio delay it's what you need to synchronize AM transmitters.

3. Contrary to FM boosters where the station practically vanishes into a heath sound at overlap area, AM boosters, adequately synchronized in frequency, audio phase, and audio delay at overlap area perform excellent. A normal listener could keep listening at the overlap area with practically no annoying or destructive interference. The seam between the synchronized transmitters could be compared to mild directional antenna cancellations at comparable signal overlap areas.

5. It's cost effective, easy, and dependable to install a network of AM synchronized stations. The FCC has on file a detailed how-to-do manual made by us on installation of boosters and the research program proposed for the synchronous booster at Guayama, P. R. (copy of it included)

6. AM stations should deserve the right to install AM boosters not only as fill in booster stations inside the 2.0 mv/m contour but to expand the signal contour just as AM directional antennas are permitted for that purpose. **What should be the limit?: the same protection that applies to co-channels and adjacent channels day or night. It would be the best use possible of the AM band.** AM synchronous boosters as an alternative to complex and costly directional antenna systems can drastically reduce the number of towers, the quantity of land and the power to be used to improve and expand the signal of an AM station. (*See footnote#2*)

7. Using just one frequency for AM main station and its synchronous boosters makes it easier for the listener to mantain tuned to your station when moving around in your vehicle since in the case of traditional networks the listener can't memorize all the different frequencies used by a network to expand its coverage. For example in the case of WAPA RADIO NETWORK, an all-news/talk network owned by me: WISO-AM, Ponce, P. R. (1260 Khz.) and its two boosters in Mayaguez and Aguadilla are perceived by normal listeners not just as a local Ponce station but as a station that covers half the island of Puerto Rico. WAPA-AM San Juan, P. R. (680kHZ.) and its Arecibo Booster is perceived by the normal listener as a big station that covers the other half of Puerto Rico.

8. Several AM sychronous stations can give superior coverage at much less installation costs, and much less electricity consumption than if you were to achieve the same with extremely high power transmitters and multiple towers directional systems.

If the FCC really wants to help AM radio AM synchronous boosters should be included in the revitalization tools packet being approved. Ample information to initiate a rulemaking on AM synchronous boosters is available from Puerto Rico experimentation with them. We urge the FCC to

initiate a rulemaking process on AM synchronous boosters.

IV. RULEMAKING PROPOSAL TO PERMANENTLY LICENSE AM SYNCHRONOUS BOOSTERS.

THE RULEMAKING THAT COULD LEAD TO PERMANENT LICENSING OF AM SYNCHRONOUS BOOSTERS COULD BE BASED ON THE FOLLOWING RULES:

(1) **AM main stations are allowed to improve and expand their signals using directional antenna arrays, and/or AM synchronous boosters.** The restriction should be that all protected contours of co-channels or adjacent channels are guaranteed day and night AND that condition #5 is fullfilled.

(2) **AM synchronous boosters** could operate non-directional, directional with lower or higher power than the main station. The restriction should be that all protected contours of co-channels or adjacent channels are guaranteed day and night.

(4) **There's no limit as to how many AM synchronous boosters are used by a main station.** The only restriction should be that all protected contours of co-channels and or adjacent channels are guaranteed.

(5) **The coverage of main station and synchronized boosters should be continuous.** That is, the main and its contiguouos booster **OR** two contiguous booster signals have to overlap their respective 2 mv/m contours. In this way the listener would tune to an enlarged coverage area without signal gaps in between.

(6) **All synchronized main and booster stations have to use the GPS Satellite 10Mhz. reference signal** at their transmitters. (Technological advantages prove it is fully dependable)

(7) The AM Synchronous boosters assigned to a main **station have to entirely rebroadcast main stations signal.**

(8) Fill-in am synchronous boosters could be imposed **a fixed fee**. For AM synchronous boosters expanding the coverage area a **percentage of the annual fee** imposed to a regular AM station could be imposed. We suggest a percentage of the annual fee imposed to a regular AM station because the booster has to rebroadcast main station's signal and because there would be an overlap area covered by both stations. The percentage could be perhaps 75%.

V. NEED FOR FCC EFFECTIVE DISSEMINATION ON THE SUCCESS OF AM SYNCHRONOUS TRANSMISSION TO GET OTHER BROADCASTERS INVOLVED:

If any broadcaster or someone in the FCC has doubts on the excellent performance of AM synchronized boosters, come to Puerto Rico where you'll find an excellent system example on the synchronous transmission made by WAPA-AM and WISO-AM. Another broadcaster in Puerto Rico, WIAC-AM has initiated more recently a synchronized operation after examining the success of our synchronous boosters development. This synchronous booster WI2XAC improves and expands the

coverage area of WIAC-AM.

Broadcasters in the continental USA probably have only seen failed experiments on the use of AM synchronous transmission. Obviously, since Puerto Rico is not a contiguous state to continental states makes it difficult to US continent broadcasters to review the succesful performance of AM synchronous boosters in Puerto Rico. We urge the Commission to make a full disclosure on the matter so that other continental broadcasters could get involved in AM synchronous boosters. **How can broadcasters get interested in AM synchronous transmission if the FCC does not divulge the success reports on the experimentation being made by Puerto Rico's broadcasters and the only knowledge they obtain on the matter is on failed experimentations in Hawaii, Florida, New Mexico, Massachusetts, Texas, and Virginia.**

VII: COMMENTS ON RATCHET RULE ELIMINATION PROPOSAL:

I share FCC proposal to eliminate the Ratchet Rule. However it should be included that all AM stations already affected by the imposition of that rule should be given the oportunity to get back the reduced coverage that was imposed by application of this rule. WAPA-AM is a good example since the ratchet rule has been applied to it in when having to relocate its transmitter and when it was licensed the synchronous booster, WA2XPA.

Respectfully submitted, on January 2, 2014.

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FOOTNOTES:

(1) W. Blanco-Pi was granted his first CP to experiment with AM synchronous transmitters in Feb/1988 (BP-870717AB) for a synchronous operation of WCQC Morovis, P. R. at Manati, P. R.

(2) If AM synchronous technology (using GPS 10MhZ. reference signal and digital audio delays) would have been available since decades ago most probably AM synchronous transmitters would have been used instead of complex directional arrays to improve and expand AM coverage.

EXPERIMENTATION WITH AM SYNCHRONOUS TRANSMITTERS BEING CONDUCTED BY WIFREDO G. BLANCO-PI IN PUERTO RICO

MAIN STATION 680 Khz.: WAPA(AM) San Juan, P. R. 10KW, U

Booster Station 680 Khz. : WA2XPA(AM) Arecibo, P.R. 0.4 KW-Day, 0.57 KW-Night

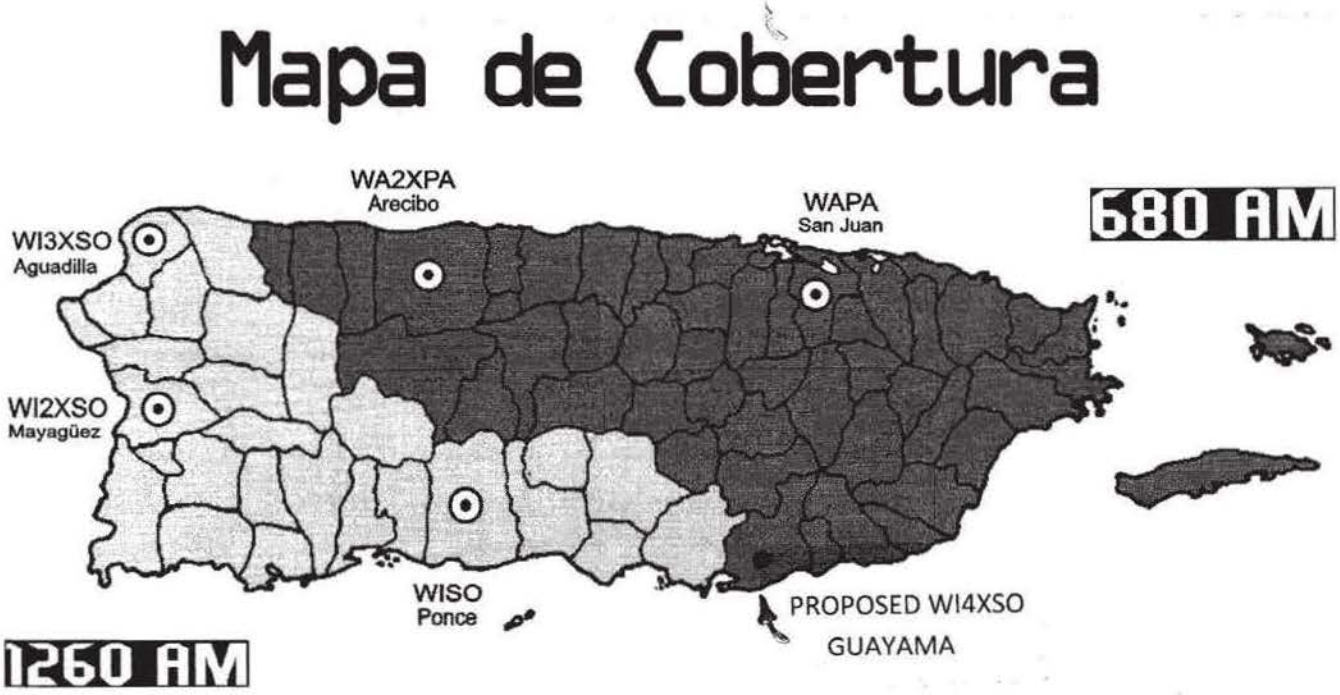
MAIN STATION 1260 Khz. : WISO(AM) Ponce, P. R. 2.5 KW, U

Booster Stations 1260 Khz.: WI2XSO(AM) Mayaguez, P. R. 5.0 KW-Day, 1.8 KW-Night

Booster Station 1260 Khz.: WI3XSO(AM) Aguadilla, P. R. 5.0 KW-Day, 4.8 KW-Night

Proposed Booster 1260 Khz.: WI4XSO(AM) Guayama, P. R. 0.75 KW-Day, 0.5 KW-Night

WAPA-AM / WISO-AM and its boosters COVERAGE MAP



BASICS FOR INSTALLING AND OPERATING SUCCESFULLY SYNCHORNIZED AM BOOSTERS

1. Use a 10 Mhz. synchronizing reference signal derived from an Ageless GPS OSCILLATOR (Ex. Spectracom's Model 5130) at each transmitter site. The cable between the GPS antenna and the receiver/oscillator should be a low loss cable preferably a Heliax 1/2 in. foam rigid cable or better. Generally the manufacturer supplies 100 ft. of RG-8 cable. It is not good enough to guarantee the 10 Mhz. signal reliability. The cable should not be longer than necessary. Not necessarily the antenna cables have to be equal in lenght at each synchronized station.

2. Use a frequency converter like Spectracom's Versa Tap to get down from 10Mhz. to the operating frequency of the AM station or booster.

3. Be sure the audio polarity is mantained along the audio path. Audio fed to each transmitter needs to be in phase.

4. Usually the delay between synchronized transmitters will be in MICRO-SECONDS. Be sure to use a micro-seconds digital audio delay like the RANE AD-22b (don't confuse it with the AD-22D) or a TOA D-1103. The digital delay should be able to increase in 10 micro-second steps to guarantee perfect synchronization.

5. Preferably use similar equipment at all transmitter locations. If one o the AM transmitters uses an output filter the other(s) synchronized transmitters need to have the output filter too. (Ex. If you are using a Broadcast Electronics AM-1A transmitter you will have to install an external output network if you want to synchronize it with a ttransmitter that has a built in output network.

6. Audio processing (Optimods or similar equipment) should be all-analog or all-digital and preferably the same model at all synchronized installatiosn.

7. AM transmitters that process audio either analog or digital can be used. Example: a Harris DX-10 (digital processing inside the transmiter) and a Gates ONe (all analog processing) can be used without generating synchronization probelms. Simply you will have to provide a little more delay to the analog transmitter to compensate for the conversion delay.

8. Performance of the synchronized stations is not affected by using a directional or non-directional antenna or combination at any of the synchronized stations.

TROUBLESHOOTING: HOW TO BE SURE THAT BOTH SYNCHRONOUS STATIONS ARE REALLY

SYNCHRONIZED?

If one of the synchronized stations is not perfectly FREQUENCY SYNCHRONIZED: You'll listen to a "waiving sound" even if your receiver is located at a specific place. Waving sound: volume will go up and down cyclically.

If the audio phase or polarity is not the same at both synchronous stations the sound will vary from "opaque" to very brilliant or with too much treble. When listening to your car's radio will driving you will find places along the road where the audio cancels almost completely.

If the audio delay is not correctly set you'll listen to heavy signal cancellations. (like those heard in some directional antenna systems). If you're listening to a car radio while driving the annoying sound will be heard periodically varying in intensity. You'll be able to find an area along the line between the two stations where the problem gets worst. At that point where the cancellations get very annoying, shrilling and strident stop your car. Then, adjust the audio delay from 0 microseconds and up in ten microseconds steps. If you're able to crrect the delay you'll notice the sound of the stations clarifies.

If the sound does not improve while varying the audio delay most probably you have the delay installed at the incorrect station. Change the digital audio delay equipment to the other synchronized stations and repeat the tuning procedure.

Example: Probably you'll find that the syncrhonized stations at the overlaping point where you detected the worst cancellations begins sounding good and the annoying sound goes away between 0.010 and 0.020 microseconds delay. Set the delay to half the difference between the lower and higher point of delay where the stations sounds acceptable at overlap area. That should be the best setting. (Note that in both recommended audio delay equipments TOA-D1103 and RANE AD-22B the display allows to measure the delay in microseconds.

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